

# **Rethinking Mobile Delivery: Using Quick Response Codes to Access Information at Point of Need**

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**ABSTRACT.** This paper covers the use of Quick Response (QR) Codes to provide instant mobile access to information, digital collections, educational offerings, the library website, subject guides, text messages, videos, and personnel in the library. The array of uses and the value of using QR Codes to push customized information to patrons are explained. A case is developed for using QR codes for mobile delivery of customized information to patrons. Applications in use at the Libraries of the University of Utah will be reviewed to provide readers with ideas for use in their library.

**KEYWORDS.** library services, mobile delivery, point-of-need access, QR codes

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## ***INTRODUCTION: WHY USE QR CODES?***

Today, people of all ages are seen staring intently at their smartphone, or other connected mobile device, tapping deliberately. Students use them to stay connected to friends and members of their cohort. Faculty use them to keep track of their busy schedules and contact students and peers. Parents use them to keep track of children. Kids use them to talk to friends, relatives, and coaches. They are all using them as a quick and convenient source of information and entertainment. According to a Pew Research Center Report, Mobile Access 2010, 59% of Americans go online wirelessly using a cell phone or laptop as of May 2010, up from 39% in May of 2009.<sup>1</sup> BBC News stated that there were more than 5 billion mobile phones in use worldwide as of July 2010.<sup>2</sup> Increasingly, the expectation of mobile device owners is that they will have access to any type of information they might want at any given time. The soaring usage of mobile devices has not escaped the attention of librarians. Librarians are looking for the most effective ways to modify services and make them accessible to this demographic.

Mobile services are a fast growing area of library service development and information access at the University of Utah. While the University of Utah campus community has not been surveyed directly on mobile device use, all indications are that students, staff, and faculty are increasing their use in accordance with the national trends. Budgets for creating mobile services and websites are routine but it can be a challenge to develop and maintain mobile services in a cost-effective manner. Developing mobile websites requires time from web developers and designers. Maintaining those sites requires constant attention. Promoting these services and providing effective mobile

information delivery is important in order to ensure a reasonable return on investment. A tool that has recently become very popular in meeting mobile information delivery demand while keeping the resource investment relatively low is the Quick Response code, or QR code.

QR codes are found everywhere. Whether in the pages of magazines, printed on flyers and posters, or added to web pages, they serve to lead customers to more information. Airlines are using them as electronic boarding passes. Retailers are providing links for customers to access detailed comparisons and make well-informed purchases. Librarians are delving into this method of information access by designing services that deliver information directly to the user's device.

### ***WHAT ARE THEY AND HOW DO THEY WORK?***

QR Codes are two-dimensional barcodes that store information to be downloaded at high speed. QR codes were first created by Denso-Wave,<sup>3</sup> a Toyota subsidiary, in 1994 as a way to track manufactured parts. Denso-Wave holds the patent rights for QR codes, but decided to make the technology freely available. The codes can be scanned with a mobile device that has a camera. Once the code is scanned, the device is prompted to load a web page or display text, telephone numbers, or other data contained in the code. There is support for QR codes on nearly every smartphone platform, including Android, Apple, Blackberry, Palm, Symbian, and Windows Mobile. Some platforms are better than others at receiving the information encoded. A large assortment of QR readers is available for free. A simple search for "QR Reader" in most mobile marketplaces (i.e., Android

Market, iTunes, Blackberry App World) locates a number of free options. These must be downloaded and installed on the device. Mobile device performance varies, and device browsers can sometimes prevent users from receiving specialized information. Experiments with Android, Blackberry, and iOS devices have had good results at the University of Utah.

Many information types can be encoded into the QR code for fast delivery to the mobile device. Links to URLs are one of the most common uses, leading the user to a website that can be saved as a bookmark for future reference. QR codes can:

- provide direct access to electronic resources licensed by the library
- automatically send e-mail messages
- deliver phone numbers for instant call back
- encode RSS feeds for quick delivery of current information
- send SMS text messages
- deliver video and audio
- share contact information (see Figure 1 – 3 below)



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**Figure 1 – 3**

The real value of QR code access is the speed and convenience with which the information is delivered. No more struggling to enter a long URL or contact's name and phone number on a tiny optical keyboard, just snap the code and go.

### ***LIBRARY APPLICATIONS AT THE UNIVERSITY OF UTAH***

The J. Willard Marriott Library (Marriott Library, <<http://library.utah.edu>>) is the primary library for the main campus at the University of Utah. The Spencer S. Eccles Health Sciences Library (Eccles Library, <<http://library.med.utah.edu>>) serves the University of Utah Health Sciences Center. There is a great deal of collaboration between these two campus libraries.

The University of Utah Libraries began their QR code implementations when the Digital Initiatives Librarian applied for internal funding through the Marriott Library's Innovation and Program Enrichment Grant. These small internal grants provide funding and support for real-time tests of innovative concepts designed to improve library services and programs. The funding was awarded and allowed a number of QR codes to be implemented at Marriott Library. Implementations included immersive, informational, and directional applications. The Digital Initiatives Librarian at the Marriott Library and the Associate Director for Information Technology at the Eccles Library decided to collaborate by implementing a series of similar QR code projects at their respective libraries.

### ***Immersive Applications: QR Codes Promote Digital Collections***

A major project funded by the 2010 Innovation and Program Enrichment Grant involved the immersive potential of QR codes with art exhibits. Each piece in Marriott Library's permanent art collection was digitally photographed, described using standard metadata, and the descriptive record was added to the library's digital collection. For the purposes of the grant, it was an opportunity to take advantage of the QR code to serve as a gateway from the physical work to its digital record. QR codes were generated for each digital image in the online collection, and then printed and mounted on foam core. The codes were placed throughout the building adjacent to the works of art. By scanning the code, the patron is able to view the digital image and additional information about the work on a mobile device. The immersive aspect allows information to be shared that wouldn't otherwise be possible, for example, the context of the piece within the larger body of the artist's work or a brief biography about the artist.

The Eccles Library hosts a collection of valuable portraits of prominent University administrators, professors, and benefactors. These portraits hang throughout the library, have been photographed, and are contained in the Eccles Library's History of the Health Sciences digital collection <<http://library.med.utah.edu/hsc/>>. The portraits in the library include small plaques indicating the name and appointment of the subject, but no further information is available. By creating a QR code for each portrait and linking it to the digital collection record, library patrons can find detailed information about the subject and the portrait through the attached metadata. This not only informs the patrons about the prominent individuals, but also promotes and highlights the digital collection.

QR codes have also been created to link to the Neuro-Ophthalmology Virtual Education Library (NOVEL, <<http://NOVEL.utah.edu/>>), a discipline-specific digital repository of educational and research materials. The codes are placed on promotional flyers, bookmarks, and business cards. Codes can be linked to the home page for the entire collection, specific collections within NOVEL, or to specific resources, including documents, images, and audio and video files. This easy capture of the NOVEL information facilitates access, promotes awareness of the resource, and encourages patrons to use, bookmark, or save materials at the point of need.

***Informational Applications: QR Codes for Mobile Class Registration***

Eccles Library offers many open classes, teaching on topics such as PubMed, EndNote, electronic resources, and software tools. The class list is published on the library's web page and in the newsletter, and flyers are placed around the library and surrounding buildings to promote the individual classes. Each flyer now contains a QR code leading directly to the registration page where the class is described more fully and the patron can sign up for the class. This provides information and makes class registration convenient and immediate. Patrons are able to immediately check a personal calendar and register for the class.

Marriott Library also offers workshops to students and faculty. QR code linking to the registration form has been added to posters listing the scheduled workshops for the semester. Patrons can scan the code and sign up for a workshop on the fly. QR codes help librarians respond promptly to the busy schedules of patrons by delivering services at the



time of need, which may be in the middle of a busy hallway on the way to a class and with just enough time to snap the code.

### ***Informational Applications: QR Codes for Reserving Group Study Rooms***

Marriott Library has several rooms dedicated to group study. Demand is quite high at peak periods of the semester. QR codes displayed below study room numbers link to the room reservation interface. Students can determine if the room is available when they need it and are able to fill out a reservation request and reserve the room by scanning the code at the point of need.

### ***Directional Applications: Finding Places and Things with QR Codes***

University of Utah libraries are generating QR codes for directional assistance. The Marriott Library is a large five-story building situated in the middle of the University of Utah campus. With extensive collections, study and classrooms located throughout the building, navigation can be confusing. By adding a QR code to the floor maps, Marriott Library is able to offer visitors an alternative to find their way using a mobile map. This also helps support Marriott Library's Greening the Marriott Library campaign <<http://www.lib.utah.edu/info/green/>> by reducing paper handouts.

The Eccles Library is situated in the center of the Health Sciences campus at the University of Utah. One of the most common questions received at the front desk phone is how to find the library. Directions are complicated at best, and parking is a challenge.

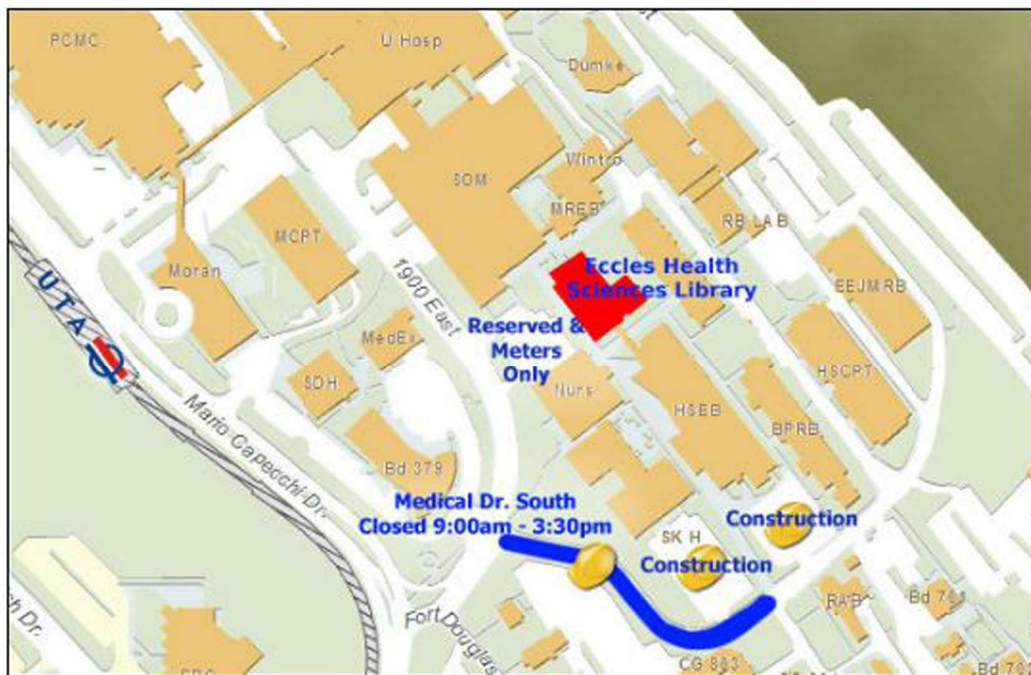
The University website has excellent maps, highlighting the buildings and available parking areas. QR codes have been created and placed on the library's directional web page (see Figure 4), as well as on informational brochures. Using the QR code, the patron can load and bring the interactive map with them as they find their way through the campus maze. This saves them the hassle of navigating a web page on their device, or entering the specific URL to the interactive map highlighting the library, which even the more adept texters would find daunting

<<http://www.map.utah.edu/?&xmin=429069.4&ymin=4513165.9&xmax=430057.6&ymin=4513904.1&find=589&aerial=off>>.

## How to Find Us

The Spencer S. Eccles Health Sciences Library is located in the University of Utah Health Sciences Center, directly south of University Hospital, northeast of the College of Nursing, east of the Utah State Health Department, and west of the Eccles Institute of Human Genetics. Signs on Wasatch Drive, Mario Capecchi Drive, Medical Drive, Medical Drive South and North Medical Drive mark the route to the Eccles Library.

### Maps



- Zoom & Click Map of the University of Utah campus
- Google Maps



Bring the map with you on your mobile device! Scan the QR code and go. - What is a QR code?

**FIGURE 4. Map with QR Code**

### *Informational Applications: Mobile Delivery Using QR Codes*

The obvious and frequent use of the QR code is to deliver information directly to a user's mobile device. Both libraries have widely disseminated QR codes leading to the library

websites. The Eccles Library used a QR code to promote the library's mobile-friendly website. Specific pages can be delivered, providing quick display on the mobile device, which can be saved for future use. Marriott Library has begun using QR codes to promote mobile versions of its research guides, which link to subject-specific resources for a wide array of disciplines.

Eccles Library is using the codes to deliver handouts and syllabi to health sciences students. All handouts and materials are compiled on a web page. Students scan the code and save the link, giving them instant access to the entire collection of materials for their course. RSS feeds can be generated using PubMed, creating a persistently current list of literature on any subject. These feeds can be encoded in a QR code and scanned for a list of the most current literature in an instant. From the display, users can tap their way to the full text, if available online.

### ***EDUCATING PATRONS AND PROMOTING QR CODE USE***

A significant challenge is educating patrons and promoting the use of QR codes for information delivery on campus. Numerous workshops have been presented on campus, starting in fall semester 2010, aimed at promoting the use of QR codes and raising awareness. Demonstrations and hands-on workshops have been offered to train library users in using QR codes and generating their own codes for use by their departments. Each library has created a web page with information about QR codes and how to use them. Flyers have been distributed around campus defining QR codes and describing their uses. Modeling is another effective method for educating others. When walking

through the library, staff carrying a mobile device can snap a code where students and faculty are gathered and show them the information received. Seeing QR codes in action can generate interest and excitement.

In the first half of 2011, there has been a marked increase in the use of QR codes in campus marketing. The University of Utah hospital uses a QR code to lead visitors to their mobile site. Campus recreation uses QR codes to promote their mobile website. Marriott Library has created a QR code for use in fundraising; a donor scans the code, picks the program they want to support, and can make a secure donation from their mobile device. The increased use of QR codes by other campus departments has helped raise awareness.

### ***GENERATING QR CODES AND TRACKING USAGE***

Both libraries at the University of Utah registered for accounts at BeeTagg<sup>4</sup> to generate and track QR codes for these implementations. BeeTagg has a QR code reader for most smartphone platforms and offers a generator and tracking service online. At the time the projects were initiated, the services were entirely free. The generator was able to produce codes encoded with a variety of information types (URL, text, phone number, business card, etc.). Codes can be downloaded in any size and in multiple formats (jpg, png, gif, etc.). The user selects the format, enters the pixel width, and clicks download. The generator tool has additional functionality, such as the ability to create folders for organizing the codes and the ability to edit the information embedded in a code. Editing the information is particularly important. The URL can be changed when the information

moves on the website, a title is updated on a business card, an e-mail address is revised, and so on. BeeTagg also offers statistical tracking of each code. Analytics can only be collected on data when the code uses one of the shortened URL's created by the generating service. The user bounces back through the Beetag website and statistics can be collected as the data pass through that server. Many QR code generator websites only use a shortened URL, while others offer direct URL coding, eliminating the ability to track usage. This tracking service helps identify which codes are being used and how often.

For example, the Marriott Library Permanent Art Collection project has received 358 scans in a 100-day period. These codes lead users to the digital record for the original art piece hanging in the Library.

The most recent EndNote X5 class received 28 scans to the registration page from flyers posted around the Health Sciences Center. The class limit is 14 students, so twice as many potential participants scanned the QR code. The Neuro-Ophthalmology Virtual Education Library (NOVEL) has received 47 scans from flyers and bookmarks distributed at a related conference. The statistical analysis from BeeTagg can be viewed by overall usage in a specified time frame or over a period of time by hours, days, months, or years. Visual charts display the uses, and an activity map shows where in the world the scans were snapped. Multiple codes can be compared.

The ability to track code usage caused some modification in how the codes were generated. For example, the NOVEL project now has a unique code for use with the bookmark, the informational handout, and the web page. This allows the project team to see which product is most utilized. Another way to track locations of users for

promotions with wide distribution would be to create separate codes for each location. An interdisciplinary program recruiting graduate students plans to prepare poster and flyers for national and international locations. To help them determine where the materials are getting the most attention, they will create an individual code for each location. This may help them target specific areas where potential students are most receptive.

During the summer of 2011, BeeTagg changed its business model and began charging for its services. Codes with no tracking or re-use are still free, but new codes with the added value services must be purchased. They are still quite inexpensive, costing \$1.00 each, but for many libraries, paying for experimental services is not an option. Fortunately, codes generated prior to the change in the fee structure are still available to the registrants, so the University of Utah libraries did not lose the codes they had created and are still able to view the statistics and edit the content.

A viable free alternative to BeeTagg offering a similar set of services is Delivr.<sup>5</sup> Delivr has provided QR code generating and tracking services since 2008. The generator can encode most types of information. The tracking analytics are excellent, and they provide an activity map showing scan locations. The dashboard lists all codes associated with an individual account. The code information is editable. The statistics report can be made public. Delivr also has some social networking features that are unique. Overall, Delivr seems to have a robust service for free, with a fee-based Pro account available for high volume marketers.

Solutions for tracking need not be left to QR code tracking systems. A few plausible workarounds would be using a tiny url generator with free tracking, or

establishing a Google Analytics account to track the url. However, it is much less complicated to leave the tracking to those generator services that offer it freely.

### ***EVOLVING CLOUD-BASED SERVICES***

The changed fee structure is a common pitfall when using cloud-based services. Relying on free services, based somewhere out on the Internet, creates the risk that the service can increase the pricing, or disappear altogether. In the case of QR codes, if the full URL is encoded, the risk is low for loss of codes generated, as the code is embedded and continues to work regardless of the existence of the generating source. However, if the proprietary shortened code is used, access to statistics and the ability to modify the embedded information could be lost. A number of code generating tools are available, each with its own set of features. Many QR code generators have a free option, though usually this does not include statistical analysis. Some of the prominent generators are shown in Figure 5.



QR Generator	Service URL	Free Codes	Types	Output Formats	Tracking	Cost	Special Features
<a href="#">BeeTagg</a>	www.beetagg.com	Yes	Plain Text Website URL Phone Number SMS Message Email Address Email Message Contact Google Maps	GIF PNG JPG PDF EPS SVG	Yes - Fee	\$1.00/code	Create editable, dynamic, secure, small, trackable and managed codes; Re-size codes
<a href="#">Delivr</a>	delivr.com	Yes	Plain Text Website URL Phone Number Services SMS Message Email Address Contact Google Maps	PNG EPS SVG	Yes - FREE	FREE; <a href="#">Delivr Pro</a> - Added features - Contact <a href="#">Delivr</a> for pricing	Color QR codes; API; <a href="#">Bookmarklets</a> ;
<a href="#">Kaywa</a>	qrcode.kaywa.com	Yes	Plain Text Website URL Phone Number SMS Message Email Address		Yes - Fee	\$1000 - set up fee, priced by volume	Re-size codes
<a href="#">QReateandTrack</a>	qreateandtrack.com	Yes	Plain Text Website URL Phone Number SMS Message Email Address Contact Event	PNG	Yes - Fee	Starting at \$19/mo; Based on volume	Color QR codes;

**FIGURE 5. QR Code Generator Comparison Chart**

## ***CONCLUSION***

QR codes are a simple, effective way to distribute information. They are quick and convenient for mobile device users. As mobile devices become more ubiquitous, it is in the library's best interest to attempt to accommodate the users of these devices by creating services that are well suited to them. QR codes have the potential to facilitate this shift and require minimal resources to implement. As noted, some of the generators and their features are subject to change, but not the codes themselves. The stable nature of QR code technology is an argument in favor of maintaining an adaptable approach when it comes to features that might change in the future.

Received: August 31, 2011

Revised: October 17, 2011

Accepted: October 23, 2011

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